

# Two new genera and a new species in the holothurian family Cucumariidae (Echinodermata: Holothuroidea)

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Two new genera, *Trachycucumis* and *Trachasina*, in the holothurian family Cucumariidae, are described. The former is erected to accommodate a new southern African cucumariid, here described as *T. plettenbergi*, from the southeast coast of South Africa, and the *Trachythyone* sp. Thandar (1991) from the northeast coast. *Trachasina* is currently monotypic and is erected to accommodate *Trachythyone crucifera* (Semper, 1869) which has remained erroneously in *Trachythyone* for so long, despite several reservations. *Trachycucumis* differs from *Trachythyone* in being a warm-water genus with body wall spicules in the form of spinous cross-shaped rods and multilocular plates with one end often prolonged as a spinous handle. The new species, *T. plettenbergi* differs from Thandar's *Trachythyone* sp. in the absence of rosette-shaped deposits and the simplicity of the plates. *Trachasina*, on the other hand, is unique in having 10 equal tentacles and sparsely distributed spicules in the form of spinous crosses, unlike those of *Trachycucumis*, and simple, thick, smooth, oval plates with few perforations and without any prolongations.

**Key words:** Holothuroidea, Dendrochirotida, Cucumariidae, new species, new genera.

## INTRODUCTION

Three specimens of cucumariid holothurians collected at 110 m from Plettenberg Bay on the southeast coast of South Africa are new to science. They are characterized by a straight, barrel-shaped body, 10 tentacles of which the mid-ventral two are reduced, ambulacral restriction of the pedicels and body wall spicules in the form of an external layer of spinous cruciform deposits and an inner layer of simple multilocular plates with one end often prolonged as a spinous handle. They were initially thought to be referable to the genus *Trachythyone* within the family Cucumariidae. However, this genus, as diagnosed by its type species, *T. muricata* Studer, 1876, is characterized by having a U-shaped body, pedicels sometimes also scattered in the interambulacra and an external layer of usually complete, shallow cups or baskets in the body wall, though the latter are occasionally reduced to simple, cross-shaped bodies (O'Loughlin & O'Hara 1992). F. Rowe (pers. comm.) is of the opinion that the new southern African species may not strictly belong in *Trachythyone* but is perhaps referable to a new genus, together with *Trachythyone* sp., described by Thandar (1991) from the intertidal waters at Cape

Vidal on the South African northeast coast. Hence for these two species the genus *Trachycucumis* is here erected. *Trachythyone* sp., based on a single juvenile, resembles the new species in possessing a straight body, ambulacral restriction of the pedicels and the predominance of cross-shaped spinous deposits in the body wall, though one or two of these may be formed into complete cups or baskets.

*Trachythyone* appears to be essentially a cold-water genus (F. Rowe, pers. comm.) or one that is predominantly Southern Ocean in distribution (O'Loughlin & O'Hara 1992). Hence the two South African species, one from the warm temperate waters of the south coast of South Africa and the other from the subtropical waters of KwaZulu-Natal, cannot be referred to *Trachythyone*. A revised diagnosis of this genus (based on all species included in it then) was provided by the latter authors, who also consider that the genus is in need of revision as some of the species may not strictly belong in it.

One such species that requires to be re-assigned is the well known shallow-water, tropical-subtropical, west Indian Ocean *T. crucifera* (Semper, 1869). Panning (1964), who revised the genus *Trachythyone*, questioned his own inclusion of this

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species in *Trachythyone* and so did subsequent workers (Thandar 1991; O'Loughlin & O'Hara 1992; F. Rowe, pers. comm.). Hence for this species the genus *Trachasina* is here proposed. *Trachasina* differs significantly from *Trachythyone* in that it has a warm-water distribution, 10 equal-sized tentacles, sparsely distributed spicules comprising an external layer of crosses, which do not appear to be basket or cup derivatives, and an inner layer of thick, smooth, oval plates very different from those of the species currently classified in *Trachythyone*.

Thus, of the four nominal and one unnamed species of southern African *Trachythyone* listed by Thandar (1991) only two now remain: *T. rigidapoda* (Cherbonnier, 1952) and *T. improvisa* (Ludwig, 1875). *Trachythyone ?parva* (Ludwig, 1875) was transferred to *Paracucumaria* by Thandar (1998). Although *T. improvisa*, originally described from Algoa Bay, has not been positively recorded since, judging from some University of Cape Town (UCT) unpublished records, this species was recognized by Cherbonnier in some of its collections but efforts to trace this material in the South African Museum, which currently houses the UCT collections, and in the Museum National d'Histoire Naturelle, Paris, where Cherbonnier worked, were unsuccessful. The species is therefore retained as the possibility exists that it may yet be found again.

### MATERIALS & METHODS

The three specimens were dredged from a depth of 110 m by the University of Cape Town's Ecological Survey. The specimens were dissected and their internal features studied according to conventional methods outlined by workers such as Deichmann (1948) and Rowe & Doty (1977). Spicules from the body wall, pedicels, tentacles and introvert were studied in all three specimens. The spicules were removed in household bleach, rinsed in two changes of distilled water and illustrated with the camera lucida. Some spicules were then rinsed in 70 %, 90 % and absolute alcohol, after which they were pipetted onto a clean, dry SEM stub. A sharp-point dissecting needle was used to spread the spicules evenly on the stub before the alcohol was allowed to evaporate. The spicules normally adhere to the stub once the alcohol evaporates. They were then sputter-coated with gold at 10–20 mA for 4 minutes using a Polaron SC500 Sputter Coater and photographed using a Philips SEM 500 at 12 kV. All three speci-

mens are deposited in the South African Museum (SAM).

### DESCRIPTIONS

#### *Trachycucumis* n. gen.

Type species: *Trachycucumis plettenbergi* n. sp.

#### Diagnosis

Small cucumariid holothurians with a straight, barrel-shaped body, 10 tentacles with the mid-ventral two reduced, tube feet restricted to the ambulacra, body wall deposits an external layer of spinous crosses and an inner layer of simple or knobbed, multilocular plates, often with one end prolonged as a spinous handle.

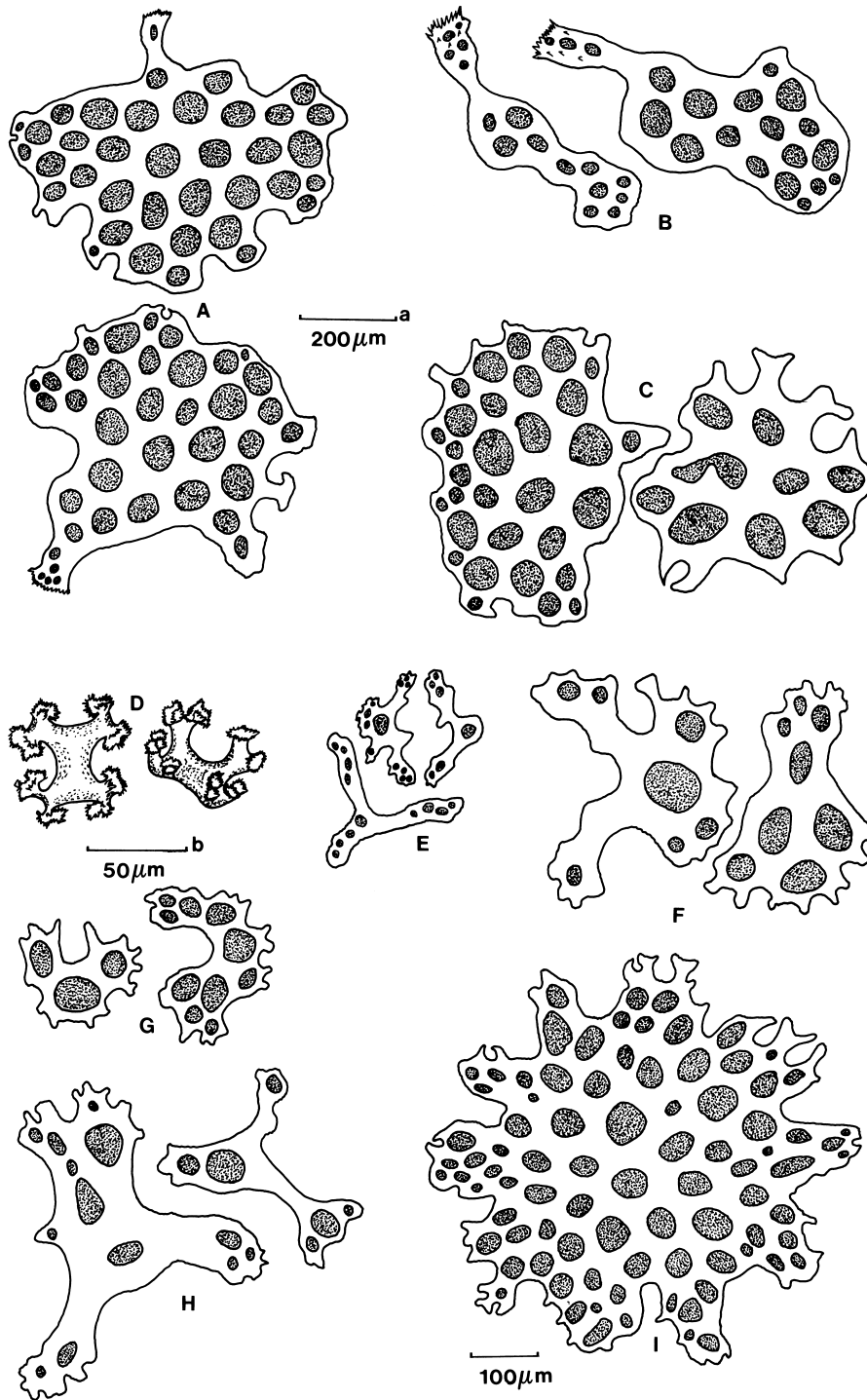
Other species included: *Trachythyone* sp. Thandar, 1991.

#### *Trachycucumis plettenbergi* n. sp., Figs 1 & 2

**Diagnosis.** Small, straight, barrel-shaped species, up to 14 mm long. Mouth and anus terminal. Colour, in alcohol, yellowish brown. Texture rough, due to spiny deposits. Tentacles 10, mid-ventral two reduced. Pedicels in 2–3 rows, interambulacra naked. Body wall spicules a superficial layer of incomplete cross-shaped deposits with forked arms, each fork terminating in two dense clusters of spines, and an inner layer of long, narrow to broad, smooth, multilocular plates, usually with one end developed as a narrow, oblique, spinous projection. Pedicels supported by irregular perforated rods and minute plates; end plates present. Tentacle spicules of two types: perforated rods, usually with a third arm, and smooth, perforated, rosette-like plates. Introvert spicules inconspicuous or absent.

**Description.** *Holotype:* specimen small, 14 mm in length, 3 mm in breadth, barrel-shaped, eviscerated but tentacles intact. Texture rough, due to superficial layer of spinous baskets and spinous projections of plates. Tentacles 10, midventral two reduced. Pedicels arranged in 2–3 distinct rows within ambulacra, end plates well developed with an uneven margin with about 10 lobes; interambulacra naked.

Calcereous ring delicate, poorly calcified. Radial and interrarial pieces not fused, the former longer; posterior margin of ring undulating. Polian vesicle and stone canal not seen. Respiratory trees poorly branched. Gonad (?ovary) unbranched.



**Fig. 1.** *Trachycucumis plettenbergi* holotype. **A**, broad stout plates from dorsal body wall; **B**, long, narrow plates from dorsal body wall; **C**, developing plates from ventral body wall; **D**, spinous crosses from ventral body wall; **E**, ventral pedicel rods; **F**, ventral pedicel plates; **G**, tentacle rosettes; **H**, tentacle rods; **I**, end plate from ventral pedicel. Scale bar a: A–C, E; scale bar b: D, F–H.

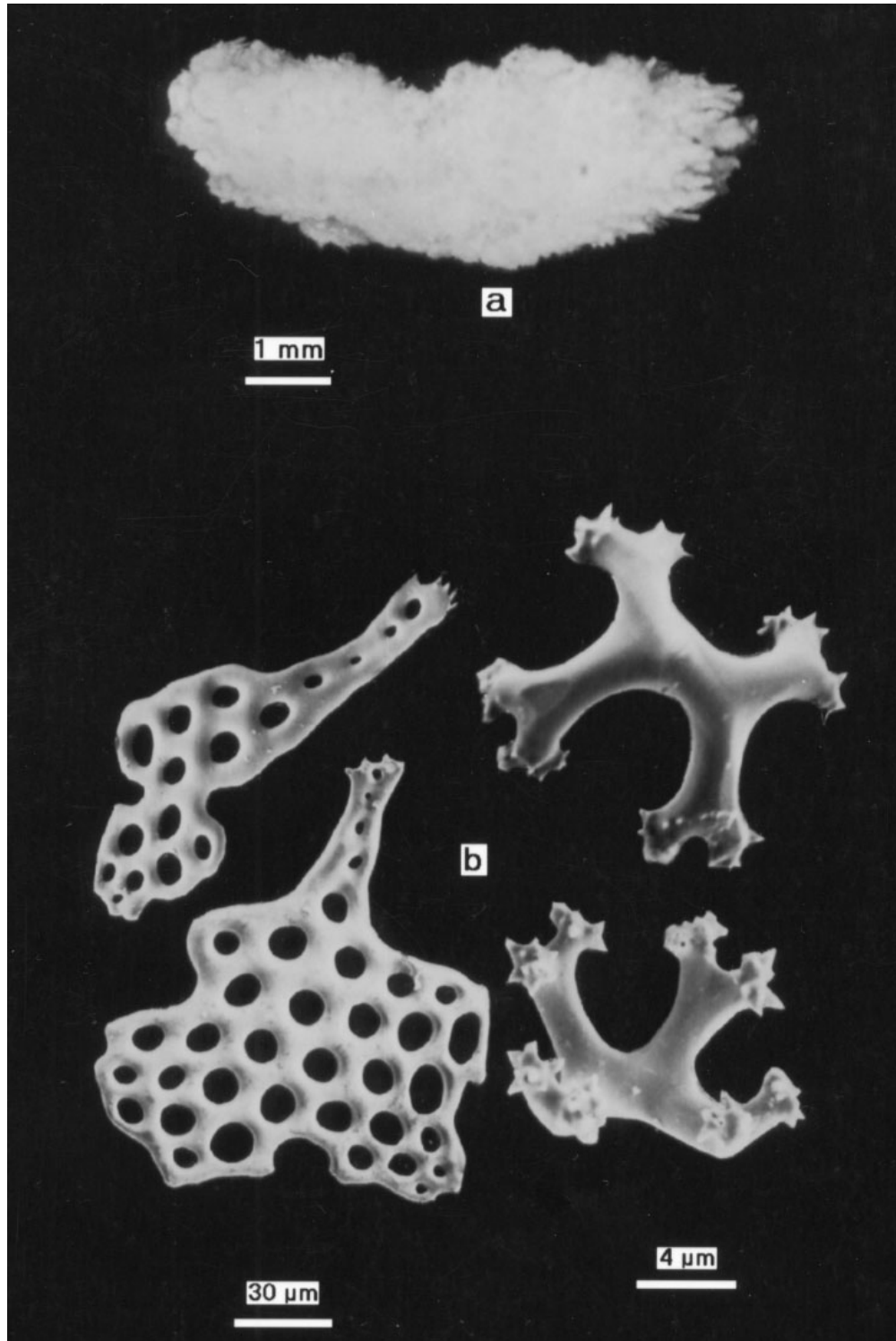


Fig. 2. *Trachycucumis plettenbergi*. a, Paratype (entire); b, spinous crosses and handled plates of body wall.

Body wall spicules of two types: a superficial layer of cross-shaped deposits, 0.044–0.076 mm (mean 0.062 mm), with dichotomously forked ends, each fork terminating in two clusters of spines, appearing as cauliflower-like clumps (Figs 1D & 2b); inner layer of large, irregular, imbricating plates 0.579–0.801 mm (mean 0.702 mm), which may be long and narrow or stout and broad, smooth, multilocular, with one end usually developed as a perforated, oblique, narrow, denticulate or spinous projection (Fig. 1A, B; Fig. 2b). Pedicels supported by irregular, perforated rods 0.142–0.516 mm (Fig. 1E) and minute (0.089–0.142 mm), irregular, smooth, perforated, rosette-like plates with 5–10 holes (Fig. 1F), the latter developing from cross-shaped rods which branch and anastomose, leaving small to large perforations, often developed as flat, basket like structures with four large central holes and four regularly alternating, smaller holes, and a spinous rim; end plates ~0.302 mm, margin irregular with about 10 lobes (Fig. 1I). Tentacle spicules of two types: perforated rods 0.089–0.267 mm (mean 0.182 mm), with usually a third arm (Fig. 1H); and smooth, perforated, rosette-like plates, 0.053–0.089 mm (Fig. 1G).

*Paratypes* (Fig. 2a): the two paratypes appear identical to the holotype in all respects except that they have slightly smaller spicules. Gonads immature. The cross-shaped bodies are well developed, occasionally forming basket-like deposits, and the spiny clumps very pronounced, even in the smaller specimen, indicating that the full complement of spicules is acquired very early in development. Despite the presence of complete plates in the smallest individual, there are other small, obviously developing plates with fewer holes, and without projecting denticulate handles. The other spicules of the paratypes match those of the holotype.

*Type material examined.* Holotype ♀, UCT Ecol. Survey, St. SCD 177 P (34°20'S, 23°31'E), 110 m, dredge, 30.xi.1960, SAM-A 27880. Paratypes: same data as holotype, 2 spec., SAM-A 27881.

*Distribution.* Known only from Plettenberg Bay, South Africa, 110 m.

*Habitat.* Rocks and khaki sand.

*Etymology.* This species is named after its type locality, Plettenberg Bay.

*Remarks.* The three specimens of this species, although collected in 1960, were only recently uncovered in numerous lots of unidentified material received from the South African Museum.

Thandar (1991) reviewed the southern African cucumariid holothurians, including 18 nominal and one indeterminate species. Since then *Neocucumis kilburni* Rajpal & Thandar, 1998, was described. Thus the new species increases the southern African cucumariids to 20 nominal and one indeterminate species.

By virtue of its spinous crosses, smooth plates with one end often prolonged obliquely into a spinous projection and naked interambulacra, the new species cannot be referred to *Trachythyone*. The body wall deposits, in combination with those of the pedicels and tentacles, confirm the uniqueness of this species. There are no significant differences between the holotype and the paratypes, except for differences in spicule size, probably a result of the greater degree of maturity of the holotype.

The characteristic crosses and plates approach those of the indetermined *Trachythyone* sp. described by Thandar (1991) based on a single juvenile (9 mm long) from Cape Vidal on the KwaZulu-Natal north coast of South Africa. This specimen, found intertidally, had a simple calcareous ring with unfused plates. The baskets (spinous crosses) described by Thandar (1991) are identical to the ones in the present material, including the occasional complete ones reported here for the smaller paratype. *T. plettenbergi* is also similar to *Trachythyone* sp. in its pedicel arrangement and form of the tentacle deposits. However, the rosette-like bodies described by Thandar (1991) from the body wall of his indeterminate species are absent in *T. plettenbergi*. Although the pedicel rods of the two species are similar, *Trachythyone* sp. lacks the type of plates seen in *T. plettenbergi*. Further, the tentacle rods of *Trachythyone* sp. are curved, while those of *T. plettenbergi* are straight, irregular and accompanied by rosette-like plates.

Of some significance is the fact that the body wall plates of *Trachythyone* sp. often appear knobbed, fir-cone-shaped with a 'handle', resembling those of *Pseudocnella insolens*. Thandar (1991) remarked on the strong resemblance of his specimen with *P. insolens*, but differentiated between the two on grounds that rosettes in the body wall of his obviously juvenile *Trachythyone* sp. are absent in all growth stages of *P. insolens*. Remarkably *T. plettenbergi* is sympatric with *P. insolens* with which it also shares the same habitat. It is also unlikely that *T. plettenbergi* from cooler temperate, southeastern waters at 110 m depth would occur

intertidally in the warm subtropical waters as far northeast as Cape Vidal. Incidentally, the material catalogued SCD 177 P also included a specimen which proved to be a 7 mm juvenile of *P. insolens*. The two species appear similar externally and perhaps share the same live colouration. This may have confounded the original collectors.

### ***Trachasina* n. gen.**

Type species: *Cucumaria crucifera* Semper, 1869.

**Diagnosis.** Medium-sized, barrel-shaped cucumariid with a straight body, 10 equal tentacles and pedicels restricted to the ambulacra, interambulacra naked. Body wall spicules not densely packed, in the form of a superficial layer of spinous crosses, not appearing to be basket derivatives, and an inner layer of thick, smooth, oval plates with few, small, oblique perforations and no projections; main shaft of crosses forked twice, with spines appearing as conical protruberances on the main shaft, absent from the distal forks of the arms.

**Remarks.** The type species of this new genus is a well known West Indian Ocean species and well described by Semper (1869), Deichmann (1948), Panning (1949, 1964) and Cherbonnier (1955), amongst others. Thandar (1991) provided some notes based on southern African material and commented on the species in some detail. Hence a further description is unnecessary. Although the new genus is monotypic and regrettably may remain so for some time, classifying the type species in any genus known to date will be duplicating the mistake of previous workers.

### **ACKNOWLEDGEMENTS**

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### **REFERENCES**

- CHERBONNIER, G. 1955. Resultats scientifiques des campagnes de la 'Calypso'. Les Holothuries de la mer Rouge. *Annals of the Institute of Oceanography, Monaco* 30: 129–183.
- DEICHMANN, E. 1948. The holothurian fauna of South Africa. *Annals of the Natal Museum* 11: 325–375.
- O'LOUGHLIN, P.M. & O'HARA, D.O. 1992. New cucumariid holothurians (Echinodermata) from southern Australia, including two brooding and one fissiparous species. *Memoirs of the Museum of Victoria* 53(2): 227–266.
- PANNING, A. 1949. Versuch einer Neuordnung der Familie Cucumariidae. *Zoologische Jahrbücher Abteilung für Systematik, Ökologie und Geographie der Tiere* 78: 404–470.
- PANNING, A. 1964. Bemerkungen über die Holothurien – Familie Cucumariidae (Ordnung Dendrochirotida). 5. Teil. Die Gattungen *Stereoderma*, *Staurothyone* und *Trachythyone*. *Mitteilungen aus dem Hamburgischen Zoologischen Museum und Institut*. 61: 159–174.
- ROWE, F.W.E. & DOTY, J.E. 1977. The shallow water holothurians of Guam. *Micronesica* 13: 217–250.
- SEMPER, C. 1869. Die Holothurien Ostafrikas. In: *Reisen in Ost Afrika* 3(1): 117–122. C.C. von der Decken. Leipzig & Heidelberg.
- THANDAR, A.S. 1991. The cucumariid holothurians of southern Africa with the erection of a new genus. *South African Journal of Zoology* 26(3): 115–139.
- THANDAR, A.S. 1998. A new genus and three new species of deep-sea holothuroids from the west coast of South Africa (Echinodermata). *Journal of Zoology, London* 244: 79–88.